

## REMARKS

Claims 1-22 are pending in the application. Claims 1, 3, 9, 11, 14, 15, and 21 have been amended. Claims 2 and 10 have been canceled, without prejudice, and claim 23 has been added.

In the Office Action mailed February 13, 2003, claims 1, 2, 8-15, 21 and 22 were considered unpatentable under 35 U.S.C. 102(b) over Tumminelli et al, U.S. Patent No. 5,365,538 (hereinafter "Tumminelli"). Claims 1-22 were considered unpatentable under 35 U.S.C. 103(a) over Peressini et al, U.S. Patent No. 6,418,156 (hereinafter "Peressini") or Baer, U.S. Patent No. 5,271,031 (hereinafter "Baer") when taken with Thony et al, U.S. Patent No. 5,982,802 (hereinafter "Thony").

Claims 1, 2, 8-15, 21 and 22 were considered unpatentable under 35 U.S.C. 102(b) over Tumminelli. However, Tumminelli fails to teach or suggest using a plurality of lasers. Instead, Tumminelli discloses using a single high power laser diode to pump energy through a window, such as window 50 (Fig. 1), 50a (Fig. 2), 50b (Figs. 3 and 4), and prism/window combination 80 (Fig. 5). The pumping energy is introduced within the pump guiding layer "so that it is reflected back and forth repeatedly between the mirrored peripheral surface to energize the one or more channel waveguide lasers." (Tumminelli, col 3, lines 18-22). A plurality of lasers positioned along a length of the waveguide would not be needed. Claim 1 has been amended to recite the use of a plurality of lasers:

1. An optical amplifier comprising:
  - a device substrate;
  - a single-mode waveguide embedded in the device substrate, wherein the device substrate comprises a cladding surrounding the single-mode waveguide;
  - and

**a first plurality of lasers positioned to provide a first plurality of light beams substantially transverse to the single-mode waveguide**, wherein each of the first plurality of lasers are spaced apart from one another along a length of the single-mode waveguide.

(Claim 1, as amended, emphasis added).

Regarding claim 9, in addition to including a limitation based on a plurality of lasers, Applicant has also amended claim 9 to include a limitation on the optical signal being directed “unidirectionally” through the waveguide. Amended claim 9 recites:

9. (Currently amended) A method of amplifying an optical signal comprising:  
**directing the optical signal unidirectionally through a waveguide**  
embedded in a substrate, the optical signal having a first direction of propagation; and  
**using a plurality of lasers to provide a plurality of light beams**  
substantially transverse to the first direction of propagation, wherein the light beams pass through a cladding of the substrate and through the waveguide, and wherein the plurality of lasers are spaced apart from one another along a length of the waveguide.

(Claim 9, as amended, emphasis added).

The “unidirectional” limitation indicates that the optical signal is not in a confined lasing medium in which the optical signal is reflected back and forth through the lasing medium until it has enough energy to escape. Amended claims 15 and 21 have limitations related to multiple light sources or lasers similar to that of claims 1 and 9. Thus, Applicant respectfully submits that amended claims 1, 9, 15 and 21 patentably distinguish over Tumminelli and are therefore allowable.

Given that claims 8, 11-14, and 22 depend either directly or indirectly on amended claims 1, 9, 15, and 21, Applicant submits that claims 8, 11-14, and 22 also patentably distinguish over Tumminelli and are therefore allowable.

Claims 1-22 were considered unpatentable under 35 U.S.C. 103(a) over Peressini or Baer when taken with Thony.

Applicant has amended claim 1 to recite:

1. An optical amplifier comprising:  
a device substrate;  
**a single-mode waveguide embedded in the device substrate, wherein the device substrate comprises a cladding surrounding the single-mode waveguide;** and  
a first plurality of lasers positioned to provide a first plurality of light beams substantially transverse to the single-mode waveguide, wherein each of the first plurality of lasers are spaced apart from one another along a length of the single-mode waveguide.

(Claim 1, as amended, emphasis added).

✓ Peressini does not teach or suggest a single-mode waveguide as recited in amended claim 1. Instead, Peressini discloses a lasing medium in which multiple modes may exist. Additionally, Peressini uses a high power laser to reflect multiple times within the lasing medium, and thus, would not need a plurality of lasers positioned along a length of the waveguide. Thony discloses a VCSEL architecture, but fails to teach or suggest a single-mode waveguide embedded in a device substrate as recited in amended claim 1. The combination of Peressini and Thony fails to teach or suggest all of the limitations of amended claim 1. It would not have been obvious to combine Peressini and Thony to yield the invention of amended claim 1. Thus, Applicant respectfully submits that amended claim 1 patentably distinguishes over Peressini, Thony, and their combination.

Amended claims 9, 15, and 21 include similar limitations regarding a single-mode waveguide embedded within a substrate. Thus, Applicant respectfully submits that amended claims 9, 15, and 21 also patentably distinguish over Peressini, Thony and their combination.

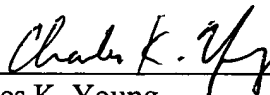
Similarly, Baer does not teach or suggest "a single-mode waveguide embedded in the device substrate, wherein the device substrate comprises a cladding surrounding the single-mode waveguide" as recited in amended claim 1. Instead Baer discloses a Nd: YAG block lasing medium. It would not have been obvious to combine Baer with Thony, because the combination would not have yielded the invention of amended claim 1. Thus, Applicant respectfully submits that amended claim 1 patentably distinguishes over Baer, Thony, and their combination. For similar reasons, amended claims 9, 15, and 21 also patentably distinguish over Baer, Thony, and their combination.

Given that claims 3-8, 11-14, 16-20, 22 and 23 depend either directly or indirectly on claims 1, 9, 15, and 21, Applicant respectfully submits that claims 1, 3-9, 11-23, as amended, patentably distinguish over Peressini and Thony, and over Baer and Thony. Thus, Applicant submits that claims 1, 3-9, and 11-23, as amended herein, are now allowable.

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Very truly yours,

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Charles K. Young  
Registration No.: 39,435

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP  
12400 Wilshire Boulevard  
Seventh Floor  
Los Angeles, California 90025  
(408) 720-8300